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NEW AUSTRALIAN DACETINE ANTS OF THE GENERA *MESOSTRUMA* BROWN AND *CODIOMYRMEX* WHEELER (Hymenoptera — Formicidae)

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The two new species described below are of considerable interest as members of the Australian ant fauna. The rare genus *Mesostruma*, to which *Mesostruma browni* n. sp. is added, includes two previously described species which have recently been revised by W. L. Brown, Jr. (1952). *Mesostruma* is known only from eastern Australia and occupies an important phylogenetic position in the subtribe Epopostrumiti, being almost exactly intermediate in character between the major Australian genera *Epopostruma* Forel and *Colobostruma* Wheeler. *Codiomymex flagellatus* n. sp. is the second member of its genus to be described from northern Queensland, and as such is the second representative of the important short-mandibulate stock of the subtribe Strumigeniti to be recorded from Australia. The deficiency of this element in the Australian fauna is of considerable zoogeographic interest. Its historical absence or scarcity on the continent has perhaps been important in allowing adaptive radiation of the short-mandibulate Epopostrumiti of the genus *Colobostruma* (Brown, 1952, 1959; Brown and Wilson, 1959).

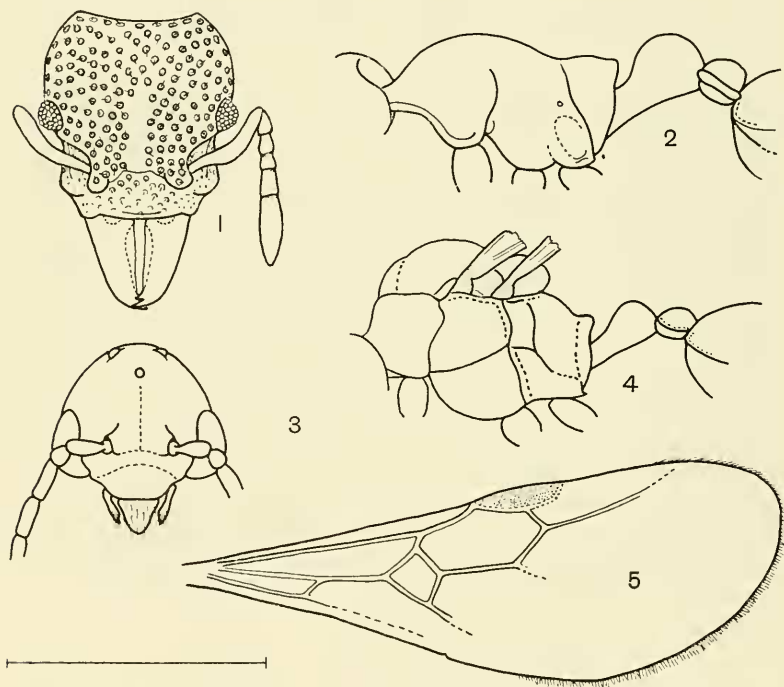
MESOSTRUMA BROWNI new species

(Figs. 1-5)

Holotype worker. Synthetic aggregate length (TL)¹ 3.6; head length (HL) 0.78; head width (HW) 0.71; mandibular extension (ML) 0.37; Weber's length of alitrunk (WL) 0.84; cephalic

¹ All measurements stated in the present paper are given in millimeters, with indices in units. The conventions followed in measurements are those established for the Dacetini by Brown (1953a, 1953b). An ocular scale with units of 0.0168 mm. was used for measuring, with correction to the nearest unit, the maximum error being estimated as ± 0.01 mm.

index (CI) 91; mandibulo-cephalic index (MI) 47. Corresponding precisely with the generic characteristics cited by Brown (1948, 1952) for head shape, mandibular and antennal structure, petiole and postpetiole form, and body sculpturing. Head shape as in Figure 1, similar to large *M. laevigata* workers, but clypeus and anterior part of head somewhat more transverse. Eyes small, strongly convex as in *M. turneri*. Humeral angles rounded; dorsum of alitrunk in profile strongly and evenly convex. Propodeal lamellae as in Figure 2, more extensive than in either previously described species. Petiolar node as in Figure 2, similar to that of *M. turneri*, but more massive and less acute above in side view.



Mesostruma browni new species, Figs. 1 and 2, worker (Holotype). Fig. 1. Full-face view of head. Fig. 2. Alitrunk, nodes and base of gaster in side view. Figs. 3-5, male (Allotype). Fig. 3. Full-face view of head. Fig. 4. Alitrunk, nodes and base of gaster in side view. Fig. 5. Forewing. Pilosity and sculpture omitted from Figs. 2-4. Scale line: 1 mm.

Sculpture of head, alitrunk and petiole consisting of large circular umbilicate foveae, more widely spaced than in the other described species, rarely separated by distances less than their maximum diameter; the surfaces between them smooth and strongly shining. Dorsum of alitrunk less densely sculptured than head, with a median longitudinal area almost devoid of foveae. Posterior parts of sides of alitrunk opaque, the foveae indistinct and mixed with coarse punctures. Foveae of petiolar node smaller than those of head and alitrunk; those of postpetiole indistinct, postpetiolar dorsum finely and irregularly sculptured and feebly shining. Dorsum of first gastric segment smooth and strongly shining, with no trace of longitudinal striae.

Color rich golden brown; petiole, base and apex of gaster, legs, mandibles and antennae lighter.

Type locality. Two miles east of Berry, New South Wales (B. B. Lowery).

Worker variation. Thirty-two *paranidotype workers*, collected with the holotype, have the following dimensions: TL 3.2-3.9; HL 0.72-0.83 (mean 0.77); HW 0.66-0.74 (mean 0.71); ML 0.32-0.38 (mean 0.35); WL 0.77-0.92; CI 89-96; MI 42-49. No significant structural variation is indicated in the series. The workers are monomorphic with no bimodality in the frequency distributions of the dimensions listed, and no perceptible allometric differentiation between the head and mandibular dimensions, within the sample.

The measurements and indices of ten paratype specimens from Riverview College, Sydney (B. B. Lowery), fall within the above ranges and have almost identical means, but an eleventh specimen of the same series is much smaller: TL 3.1; HL 0.69; HW 0.62; ML 0.34; WL 0.74; CI 90; MI 49. The HL of this individual is 2.80 standard deviation units smaller than the overall mean HL of all 45 specimens examined ($76.7 \pm \text{SD } 2.75$), its HW is 3.0 standard deviation units smaller than the overall mean HW ($70.4 \pm \text{SD } 2.80$). The specimen is thus of extremely small size when compared with workers from mature colonies, and is perhaps an old nanitic which had survived into the mature colony with which it was collected.

A single paratype worker from Barrington Tops, New South Wales (T. E. Woodward), has the following dimensions: TL 3.2; HL 0.72; HW 0.66; ML 0.32; WL 0.77; CI 92; MI 44.

Paratype queens. The first series of dimensions are those of an alate from Burns Bay, Sydney (B. B. Lowery); the second

series those of a dealate from Pymble, New South Wales (C. Mercovich). TL 4.0, 4.3; HL 0.80, 0.86; HW 0.76, 0.82; ML 0.37, 0.40; WL 1.07, 1.16; CI 95, 95; MI 46, 46. Differing from the workers in the usual characters of full sexuality: larger size, presence of ocelli and wings, and unreduced structure of alitrunk. Coloration as in worker, the ocellar area dark brown. Wings clear with pale yellow veins, venational pattern similar to male. The same diagnostic features as those of the worker serve to distinguish queens from those of *M. turneri*.

Allotype male. TL 3.0; HL 0.54; HW including compound eyes 0.63; WL 0.88; forewing length *ca.* 2.2 mm. Head as in Figure 3. Compound eyes large, elliptical, strongly convex, their longest diameters about 0.28 mm. Mandibles slender, acute, probably not opposable. Antennae robust, thirteen segmented. Maxillary and labial palpi well developed; palpal formula apparently maxillary 5, labial 3, as in the worker (the mouthparts have not been dissected from the unique specimen). Body profile as in Figure 4. Mesonotum with well developed notauli, their posterior portion, forming the stem of the "Y," indistinct. Propodeal lamellae smaller than in the female castes. Petiole sub-clavate, the node low, sloping gradually back from the anterior peduncle; antero-ventral tooth obsolete. Lateral edges of post-petiole lacking aliform appendages, but each with a distinct, low, obtuse, longitudinal carina. Gaster broad, somewhat flattened basally; the basal edges of its first segment feebly carinate longitudinally, as in many epoposturmite workers. Genitalia exposed, enfolded by the parameres. The latter similar to those of *Orectognathus* (Brown, 1953b): broad in dorsal view, with convex lateral outlines and strongly concave inner faces, the apices rounded with their tips turned inwards and opposed mesally. Apex of sub-genital plate acute. Cerci short and stout. The penis valves and volsellae have not been dissected from the specimen.

Forewing venation (Fig. 5) of the *Solenopsis* type, as in *Orectognathus*, the apical elements (Rs₁ 5, Mf 4 and Cu-A) feebly developed, and the radial cell open. Hindwing narrow, with a broad posterior fringe of microtrichiae, and four well developed subapical hamuli: venation as in *Orectognathus*.

Head and most of alitrunk coarsely and closely punctate. Punctures of the pronotal dorsum and prescutellar area similar to the foveae of the workers, but almost contiguous. Sides of alitrunk with quite extensive shining areas, especially on the

median parts of the larger sclerites. Petiole and postpetiole with coarse punctures, those on the latter shallow and irregular. First gastric tergite semi-opaque, with very irregular and shallow large, flat, piligerous punctures.

Color blackish-brown; antennae, mandibles, under-mouthparts, and legs yellowish-brown. Wings clear, their veins pale yellow.

Described from a unique specimen collected with the holotype and its associated paranidotype worker series.

Material examined. Northeastern New South Wales: 2 miles east of Berry (type locality) December 28, 1959, holotype and 32 paratype workers, allotype male (B. B. Lowery). Burns Bay, Sydney, February 2, 1959, ex leaf litter, a single alate queen (paratype) (B. B. Lowery). Riverview College, Burns Bay, Sydney, April 19, 1959, eleven paratype workers (B. B. Lowery). Pymble, Sydney, March 18, 1956, a single dealate queen (paratype) (C. Mercovich). Barrington Tops, ex leaf mould (Berlese funnel sample), a single paratype worker (T. E. Woodward).

The holotype, with paratypes, has been returned to Father Lowery for eventual deposition in the Commonwealth Scientific and Industrial Research Organization collection at Canberra; the allotype, with paratypes, is in the Museum of Comparative Zoology, Harvard University; the remaining paratypes are in the Queensland Museum.

Biology. The following information regarding the biology and ecology of *M. browni* has been provided by Father Lowery.

The type locality is about two miles inland from Seven Mile Beach, in low hill country behind scrubby alluvial coastal flats. The collection was made in a grassed clearing in a heavily timbered area, with *Eucalyptus* and turpentine growing in black non-sandy soil.

The Riverview College locality overlooks Burns Bay, Lance River Cove, Sydney. The colony taken there was found nesting in damp yellow sand beneath a cover of moss and a little grass. The site was in a clearing in low scrub about 15 to 20 feet high, with *Eucalyptus corymbosa*, *Grevillea*, *Lantana* and *Leptospermum*. The soil near the nest contained a few small termite galleries and a large nest of the locally dominant ant *Acropyga australis*. The alate paratype queen was collected nearer the Burns Bay foreshore, wandering on leaf litter in warm sunshine, during the late afternoon.

Father Lowery has collected three further colonies of *M. browni* within 200 meters of the type nest site. One of these

colonies was nesting about four inches below the surface of coarse black sandy soil, under a small rock, but probably not in direct contact with it. A maze of termite galleries was located immediately beneath the rock, and permeated the surrounding soil.

The new species is dedicated to Dr. W. L. Brown, Jr. of Cornell University, a leading authority in ant taxonomy who has worked particularly with the Dacetini and has devoted much study to the Australian ants in general.

The addition of *M. browni* to *Mesostruma* requires no change in the basic concept of the genus, as formulated by Brown (1952). Indeed *Mesostruma* retains its appearance as a compact and distinctive genus, with its species abundantly distinct from each other.

Considering the characters of the worker and queen, *M. browni* seems to be most closely related to *M. turneri* Forel, which it resembles in the structure of the alitrunk, propodeal lamellae and petiole. It has a proportionately narrower head, however (see Brown and Wilson 1959, fig. 7), and lacks the longitudinal striation of the basal gastric segment seen in *turneri*. The absence of humeral denticles, and the general form of the alitrunk, propodeal lamellae and petiole distinguish *M. browni* from *M. laevigata* Brown. The new species differs from both the previously described species in its less dense sculpturing and overall glossiness, and its more extensive propodeal lamellae and more massive petiolar node. The three known species of *Mesostruma* may be separated by the following key (based on the workers).

1. Humeri rounded; dorsum of alitrunk strongly and evenly convex in profile; eyes protruding and very convex 2
 Humeri acutely subdentate; dorsum of alitrunk not so markedly convex in profile; eyes less convex and protruding only slightly. (Victorian mallee) *M. laevigata* Brown
2. Head broad, CI 98-100; head capsule opaque, the foveae almost contiguous; gaster finely longitudinally striate over basal half or more of segment I (vicinity of Cairns, Queensland) *M. turneri* Forel
 Head narrower, CI 88-96; head capsule strongly shining, the foveae separated by smooth areas at least as wide as their maximum diameter; basal segment of gaster smooth and strongly shining (northern New South Wales) *M. browni* n. sp.

In the discussion above I have not considered the enigmatic species *?Mesostruma monstrosa* (Viehmeier), 1925 (Brown, 1948). The unfortunate circumstances surrounding the original

selection of this species, which was based on an apparently abnormal specimen, have been discussed by Brown (1952). Dr. Brown now believes (personal communication) that Viehmeyer's species was most likely based on a defective *Epopostruma* specimen. In any case *monstrosa* seems best ignored, pending the location and competent re-examination of the type.

CODIOMYRMEX FLAGELLATUS new species

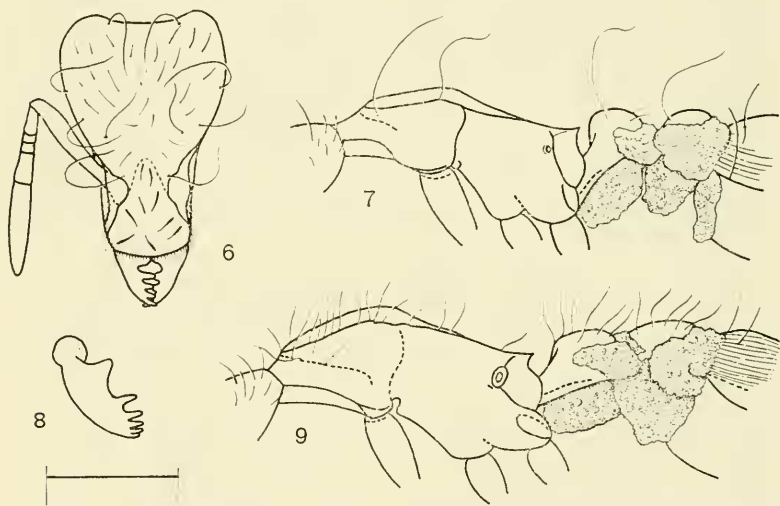
(Figs. 6-9)

Holotype worker. TL 1.9; HL 0.48; HW 0.32; scape length (SL) 0.23; ML 0.08; WL 0.47; CI 68; MI 19. General form much as in *C. semicomptus* Brown (1959) (Fig. 9), but smaller and more lightly constructed. Shape of head as in Figure 6. Dorsal surface of cranium convex, sloping towards occiput and clypeus as in *C. semicomptus*, the convexity less pronounced, however, and the occipital lobes more broadly rounded when viewed from the side (*cf.* Figs. 7, 9). Mandibles strongly convex, rising above the anterior clypeal border; with five strong, acute, conical teeth, each slightly smaller than the one posterior to it. Basal lamella normally hidden at full mandibular closure, set at a slightly lower level than the teeth and oblique to them; its shape as in Figure 8—roughly right-triangular, the posterior edge almost perpendicular to the mandibular axis, and the anterior edge diagonal, forming the hypotenuse. The anterior lamellar edge rises almost immediately from the base of the proximal mandibular tooth so that the diastema is very brief. Clypeus almost perfectly plane.

Body profile somewhat as in *C. semicomptus*, with which it is compared in Figures 7 and 9. Alitrunk narrow, its maximum width 0.59 x the HW; its dorsum almost perfectly plane, without sutures or a median longitudinal carinula. Alitrunkal dorsum in side view evenly arched between the pronotum and the propodeal teeth. In dorsal view the sides of the pronotal disc are evenly rounded and those of the remaining alitrunkal dorsum almost parallel, with the distance between them, at the base of the propodeal teeth, slightly more than half the pronotal width. Dorsum of alitrunk margined with a fine carina, less distinct than in *C. semicomptus*, enclosing the pronotal disc anteriorly, and continuous with the upper edges of the propodeal spines posteriorly. The latter with their infradental lamellae similar to those of *semicomptus*. Propodeal spiracle minute, circular, its margin not appreciably expanded; it contrasts with that of *C.*

semicomptus, which is larger and has a wide and very conspicuous rim-like margin (Fig. 9). Profile of petiolar node as in Figure 7, shorter than that of *semicomptus*, only about as long as high in side view; seen from above the node is slightly longer than broad with rounded sides and a truncate anterior border. A full complement of areolate spongiform appendages is developed, distributed normally as in Figure 7. Gaster depressed; basigastric costulae reduced to about five feeble lines on either side of segment one, the two groups of costulae separated by a wide median shining area; the costulae extend back about $\frac{1}{10}$ the length of the segment.

Mandibles shining, with a few scattered punctures. Head capsule with a close cover of large, flat, irregular, shallow punctures, which are almost effaced in a small region in the center of the frons. Antennae very finely punctate, their scrobes punctate-granulose. Alitrunk, both nodes, gaster, legs and anterior parts of frons and clypeus smooth and strongly shining. Petiolar peduncle coarsely granulate.



Codiomyrmer flagellatus new species, Figs. 6-8, holotype worker. Fig. 6. Full-face view of head. Fig. 7. Alitrunk nodes and base of gaster in side view. Fig. 8. Mandible. *Codiomyrmer semicomptus* Brown, paratype worker. Fig. 9. Alitrunk, nodes and base of gaster in side view. Scale line: 0.16 mm., for Fig. 8; 0.25 mm., for Figs. 6, 7 and 9.

Occiput with a number of very fine long (0.05-0.08 mm.) hairs with clavate tips, somewhat finer than in *C. semicomptus*. Hairs of clypeus shorter and more distinctly clavate. A very few similar hairs are present on the anterior part of the pronotal disc and the dorsal surfaces of both nodes. The pilosity otherwise consists of exceedingly long (0.13-0.36 mm.), fine, tapering hairs, which are distributed symmetrically. On the head, five pairs in the following positions (see Fig. 6): on the occipital border, about halfway between its midpoint and its lateral extremity on either side; on either side and a little anterior to the median part of the frons; at the edge of the cephalic dorsum just anterior to its widest point; at the edge of the cephalic dorsum at about mid head length; on either side of the posterior extension of the clypeus, above the antennal insertions. On the body, six pairs: two pronotal; one on each node; two at the base of the gaster—distributed as shown in Figure 7. On the forelegs: a single flagellum on the outer side of the tibia, near its apex. On the middle and hind legs: single hairs on the outer sides of the limbs near the bases of the tibiae and basitarsi. These long flagella curve upward and inward on the head capsule; those of the body are erect with their apices turned posteriorly; the anterior pronotal and postpetiolar pairs are more tangential, and inclined laterally.

Type locality. Clump Point (near Mourilyan) Queensland. June 3, 1953 (T. E. Woodward), collected from a Berlese funnel sample of leaf mould.

Worker paratype variation. Seventeen worker paratypes, collected with the holotype, show no significant variation in size or structure. The specimens have at some time been subjected to drying and fungal attack while in alcohol storage, with the result that some are fragmentary. A few fungal hyphae are still attached to several of the specimens, and a number have had the pubescence, particularly the elongate flagella, damaged during the consequent cleaning.

Among the known *Codiomyrmex*, *C. flagellatus* is most closely related to *C. semicomptus* Brown, the only other known Australian species. The general resemblances between these forms are indicated in the accompanying figures. The two species may be readily separated by the characters discussed in the above comparative description; the differences in size, pilosity, and propodeal spiracular structure are especially characteristic.

The adaptive significance of the peculiarly sparse and elongate body pilosity of *C. flagellatus* is not understood, and deserves examination should live material become available for future study.

The holotype, with paratypes, has been placed in the collection of the Queensland Museum. Paratypes are deposited in the Museum of Comparative Zoology, Harvard University, and the Commonwealth Scientific and Industrial Research Organization Collection, Canberra.

I wish to acknowledge the generous assistance of Father B. B. Lowery of Sydney, and Dr. T. E. Woodward, of the University of Queensland, who collected the bulk of the material cited above and made it available to me for study. I wish also to thank Dr. E. O. Wilson, of Harvard University, for his assistance and advice during the preparation of this paper.

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